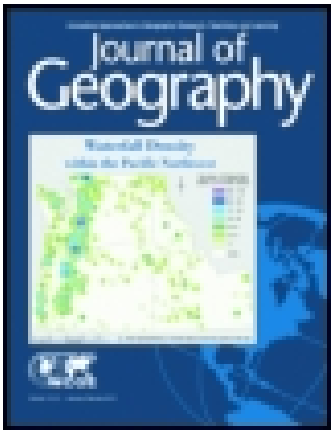

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MINERAL RESOURCES OF OHIO

By J. A. BOWNOCKER, State Geologist

THE mineral resources of Ohio are varied and extensive, though restricted almost entirely to the non-metalliferous group. The more important varieties follow:

1. Soils
2. Fuels
   (1) Coal
   (2) Petroleum
   (3) Natural gas
   (4) Peat
3. Clays
4. Building stone
5. Materials for lime and Portland cement
6. Salt

SOILS

The most valuable and enduring of the resources of Ohio is the soil. It may be divided into two general classes, (1) residual soils and (2) transported soils. The latter are by far the more extensive and include the best soils of the state. To this division is assigned the soils of glacial origin which cover about three-fourths of Ohio.

GLACIAL OR DRIFT SOILS: Along the shore of Lake Erie is a strip varying in width from a few miles in northeastern Ohio, to 50 miles in the northwestern corner, over much of which the soil is a fine loam. This is well suited for gardening and general farming. It has the advantage also of the moderating influence of the lake which prevents late spring frosts and the rigors of winter. Largely on this account the lake shore is extensively given to the growing of grapes, peaches and other fruits. Gardening is practiced in the large way in the vicinity of Cleveland and to a smaller extent near Sandusky and other smaller cities.

The soils of the northeastern part of the state and south of the loams of the lake plain are often clayey and hence wet and hard to work. In places, however, the soil contains enough sand and gravel to insure air and water drainage and then may be of excellent quality, as parts of Summit county. Farther south and west the soil becomes more sandy, due to the underlying rock, and then does very well for general farming. Good examples of this type may be found in Richland, Knox and Licking counties.

Western Ohio has a limestone floor and is covered with drift and for these reasons the soil is choice. In fact it ranks among the very finest tracts of its size in the United States. Valley soils in this territory are unusually fine and those of the Miami and Scioto are notably good. General farming is practiced, but corn in particular does well. Tobacco is grown on a large scale in Montgomery, Darke, Brown and other counties.

NON-TRANSPORTED OR RESIDUAL SOILS. These are to be found on the hills or uplands in southeastern Ohio. Since foreign material has not been added the character of the soil is dependent on the bed rock which

consists in large part of sandstones and shales with some limestone. Soils derived from the first two named rocks are likely to be rather poor, but those derived from limestone may be very good. Farmers understand this and state with pride that their "farm is a limestone one." Such soils are found in parts of Jefferson, Harrison, Belmont, Monroe, Noble, Morgan and Athens counties. Unfortunately the topography is usually rough, making the soil wash badly and sometimes prevents the use of up to date farm machinery.

General farming is followed but the results, as a rule, are unsatisfactory. What should be done is an open question, but in the writer's judgment grazing, poultry raising and fruit growing promise well.

FUELS *

Second in value to the soils are the fuels—coal, petroleum, natural gas and peat.

COAL. Until the invention of the steam engine little use was made of coal, though its properties and uses were understood for centuries. With the construction of railroads its demand grew rapidly, so that a former State Geologist referred to coal as the "mainspring of our civilization."

Ohio has large coal deposits and the state ranks fourth in output. The principal coal fields of the state are the following:

SOUTHERN OHIO FIELD. This includes parts of Jackson, Vinton, Lawrence and Gallia counties, and yields some of the best coal of Ohio.

THE MEIGS COUNTY FIELD. The area of this is small; farther north and west, it is too thin for mining in a large way.

Athens, Perry and Hocking counties; thickness of the coal 4 to 6 feet; Athens, Perry and Hocking counties; thickness from four to six feet; quality, good though not the best. The field began to be worked in the large way about 1870 and is now past its zenith.

THE HOCKING VALLEY FIELD. This great field includes parts of Athens, Perry and Hocking counties; thickness of the coal, 4 to 6 feet; quality, good; field worked since about 1870; now past its zenith.

THE COSHOCTON-TUSCARAWAS FIELD. The coal is thinner than in the Hocking Valley field, but the quality is slightly better.

THE MASSILON FIELD. Named from Massillon, Stark County, the center of the field. The coal is of excellent quality but the seam is rather thin and the quantity remaining small.

THE CAMBRIDGE FIELD. This extends from near Cambridge, Guernsey County to Caldwell, Noble County. The coal does not make a first class coke and is too soft to bear transportation well. However, it is suitable for general fuel purposes and has a large market. This field is probably at its zenith.

*The following pages will be rendered more intelligent by consultation with the Geological Map of Ohio, which may be secured for 25 cents (stamps not accepted) from the State Geologist, Columbus, Ohio.

THE BELMONT COUNTY FIELD. This includes nearly the whole of Belmont County and parts of surrounding counties. This field rivals the Hocking Valley for first place in Ohio and its production will probably increase faster than that of any other field in our state. This was the last great field to be developed, and it will probably be a large producer after the other fields named have been exhausted.

While Ohio has extensive coal deposits they are anything but inexhaustible. Not only is more coal mined each year than during the preceding one but the increase is very rapid, jumping from 11,500,000 tons in 1890 to 26,270,000 tons in 1908. It is this rapid increase that is alarming. One hundred years hence all the great fields of Ohio will be practically exhausted and a century later will find our state without coal.

PETROLEUM. This invaluable fuel was discovered in Northwestern Pennsylvania in 1859. A year later a successful well was drilled near Macksburg in the northern part of Washington County and the industry in Ohio dates from that time and place. The producing territory was slowly extended until at present it extends from Columbiana County on the north to Washington on the south.

Of course oil is not found everywhere in this large area; but usually occupies relatively small, separate tracts known as pools. The wells vary in depth from less than 100 feet to about 2,500. Wells starting at 500 barrels per day have been very rare, and the operator who secured a 100-barrel well rejoiced.

In 1885 oil was discovered in the Trenton limestone at Findlay, natural gas having been found there a year earlier. Wells were sunk in rapid succession making the production greatly in excess of the demand, and decreasing the price of oil until it fell to about 15 cents per barrel. Wells are still being sunk, but probably a half dozen old ones are abandoned to where a good one is completed. This field gave Ohio the first rank among oil producing states, but the steady decrease of the wells during the past ten years is largely responsible for loss of that rank and in all probability it will not be regained. The wells in northwestern Ohio usually range from 900 to 1,400 feet in depth, while the initial daily production has varied from a few barrels to thousands, though the latter were anything but common.

A few years ago oil was discovered in the Clinton sand near Bremen, Fairfield County, and drilling is still very active. These wells are very deep, from 2,000 to 3,500 feet, and hence expensive. This sand is now being tested northward to the lake and south to the Ohio River. Further important discoveries may be made.

From what has been said it is clear that Ohio has passed the zenith in oil production and while the state will yield the fuel in large quantity for some years at least it will be at a diminishing rate.

NATURAL GAS. Ohio ranks third among the states in the value of nat-

ural gas produced. The fuel was first found in large quantity at Findlay in 1884, but it was used in so shameful a manner that the supply, large as it was, was soon exhausted. In 1887 gas was found in the Clinton sand at Lancaster, marking the opening of one of the finest fields of this fuel ever discovered. Since that year the drill has been busy and the field extended from near Logan on the south to the vicinity of Mt. Vernon on the north. The supply of gas has been very great and a large part of the population of our state is dependent on it. The limits of the field seem to have been practically reached and the outlook is not promising.

PEAT. Ohio contains a large quantity of this fuel, though the fact is not well known. The largest deposits exist on the divide between Lake Erie and the Ohio River. As yet they have not been worked, nor are they likely to be, so long as coal and other fuels exist in large quantity. They constitute a fuel reserve that will prove of great value to coming generations.

CLAYS

The best clays of Ohio are used in making pottery, an industry in which the state excels. East Liverpool leads in this industry but there are many other places where the work is on a large scale. Art ware is made at Coshocton, Zanesville and Cincinnati. The Rookwood art ware of the latter city has an international reputation.

Ohio leads in the manufacture of roofing tile and is second to Pennsylvania only in brick-making. The quality of the bricks is unexcelled. Shawnee, Perry County and Union Furnace, Hocking County are well known centers. Sewer pipe is another large industry and in this also our state holds first place. The state has the combined advantage of extensive clay deposits, nearby fuel, excellent transportation facilities, and proximity to the center of population.

The deposits of clay in Ohio are practically inexhaustible. To be sure the finest varieties are wanting, but very large quantities of good grade exist. The best of these are associated with the coal beds of southeastern Ohio, and are extensively worked.

The shales outcropping in central Ohio and along the Lake Shore in northeastern Ohio do fairly well for the more common products such as sewer pipe and bricks. The supply of the raw material of this grade is ample to meet the needs of the entire country for an indefinite period.

Over the glaciated part of the state is much clay that may be used for bricks and drain tile. Occasionally the quality is excellent, and bricks made from this material have found a market for one of the finest structures in New York City, and excellent buildings elsewhere.

BUILDING STONE

The Berea sandstone is one of the best building stones in this country. It has long been quarried on a large scale in Cuyahoga and Lorain Coun-

ties and has had an extensive market from New York to Chicago. Many of the finest structures, especially residences are made from it. The stone has a gray color when quarried but changes to a dull buff on exposure. It works well and is easy to carve. Other uses for it are pavements, curbings and grindstones. In fact it is the principal stone in the United States for the latter purpose. While the quantity of the Berea stone available is large it is far from inexhaustible.

Other building stones in Ohio are the Columbus, Niagara, Monroe and Cincinnati limestones. The first named is quarried at various places from Columbus on the south to Kelley's Island on the north. The State House is the best known structure built from it. The Niagara limestone is quarried at Springfield, and makes an excellent building stone. Greenfield, Highland County is the one center for the Monroe limestone. It occurs in thin even beds and is in every way desirable. Cincinnati has used much of it in former years.

The use of cement has greatly decreased the demand for building stone, so that many of the quarries are idle. In fact the Berea is the only one of the Ohio stones for which an active market is maintained.

Materials for Lime and Portland Cement

As all know lime is made by simply burning limestone, and in this work Ohio is very active. Formerly kilns were numbered by the hundreds, but with the concentration of industries lime making has become centered at a few points and is there generally conducted on a large scale. Springfield is the one important location in southwestern Ohio, but in the northwestern corner of the state lime is extensively burned at a number of places. The supply of rock is immense, the western half of the state being underlain with it and Ohio could produce enough lime to supply the whole United States.

For making portland cement a marl or limestone and clay are needed. Marl has been used in Logan County and is now in use near Sandusky, but elsewhere in Ohio, limestone furnishes the carbonate of lime. The clay is supplied either by beds of shale or clay. The quantity of these materials is large, and with a favorable market Ohio will become a very heavy producer.

Salt

When the pioneers first came to Ohio they were obliged to transport salt across the Appalachian mountains and this made it expensive. Later salt springs were found and the waters were evaporated in iron kettles. Wells were dug and stronger brines secured, and salt making became an important industry in the southeastern quarter of the state. Later, however, salt was made cheaper in New York and Michigan and many of the Ohio furnaces were abandoned. About twenty-five years ago rock-salt was found in drilling a deep well at Newburg, near Cleveland, and a salt furnace was soon in operation. The mineral was found at other places in that part of Ohio and now it yields great quantities of salt.